

What Kuhn Really Said

DIANE VILLEMAIRE

Paul Hoyningen-Huene. *Reconstructing Scientific Revolutions. Thomas Kuhn's Philosophy of Science*, trans. Alexander T. Levine. Chicago: University of Chicago Press, 1993.

Reconstructing *Scientific Revolutions* is the most significant book on the philosophy of Thomas S. Kuhn in print. Written in close collaboration with Kuhn during a year which Hoyningen-Huene spent at M.I.T., the book might have been titled "What Kuhn Really Said" or "What Kuhn Really Meant." What Kuhn has really said is that science cannot be a purely objective study of reality as it is in itself; but rather, science is simply the attempt to understand and explain an experience-dependent "phenomenal reality." The history of science illustrates the history of attempts to achieve a goal which, in fact, cannot be realized. Obviously, important questions about truth are implied here. First, the very existence of objective absolute reality is called into question. Second, what, if anything, can be revealed by the methods of science? Third, is science drawing closer to an explanation of anything, including objective reality, if it exists? The answers to these questions are surprising.

First, objective reality, as it is in itself, that is the "one real world" as the object of science, is dismissed by Kuhn as unknown and his philosophy does not deal with it. No philosophy of science can test a match between scientific theories and absolute reality because we do not have access to a perfect description of that reality. It is meaningless to discuss what there really is in itself outside of all theory, because we have no basis in knowledge of absolute reality with which to compare the theories. Instead, there is the phenomenal world where reality is the product of interaction between an empirical object-sided "moment" and a perceptual subject-sided "moment" in consciousness. Hoyningen-Huene explains this concept, which is neither idealist nor real-

ist, in his chapters "The World Concept" and "The Constitution of the Phenomenal World."

The answer to the second question: What can the study of science reveal? is knowledge of the phenomenal world. The phenomenal world is the one addressed by science and described by the language of scientists. The phenomenal world is a changing world. It depends upon the reigning scientific community for its description. Changes in the description of the phenomenal world, which is language-based and object-sided, result from changes in perceptions of the phenomenal world, which is both subject-sided and object-sided. This is not an easy concept to communicate in a single sentence; but it means that a practicing community of scientists learns certain similarity relations within the matrix of their formal educations in a specific, specialized discipline. However, they do not necessarily learn the similarity relations of the matrix in complete uniformity. The variety of interpretations of the learned patterns of similarity-difference relations among individual scientists produces different answers to the same scientific problems/questions. Ultimately, the various interpretations can lead to changed criteria for definitions, changed meanings for language, and what Kuhn has called a changed lexicon structure.

Changes in the phenomenal world would seem at first to be really changes in world view; however, in Kuhn's philosophy, the subject-sided component is more highly valued than traditional conceptions would have it. For example, a post-revolutionary world would possibly contain phenomena and objects lacking in the pre-revolutionary one, because attention would be drawn toward new phenomena; old ones previously valued could become inconsequential. Familiar objects could be seen in a different light; even numerical data might change if the revolution involved new methods of measurement or new interpretations of what the measurements meant.

Scientific revolutions which produce changes in the phenomenal world are language/perception-based. How these language/perception changes come about is the heart of Kuhn's philosophy of science and the basis for the structure of scientific revolutions. The most problematic areas in Kuhn's philosophy are addressed by Hoyningen-Huene and cleared up in the chapters "The Constitution of the Phenomenal World" and "The Concept of a Scientific Revolution." These chapters offer some new explanation and some revision of Kuhn's learning theories, which

describe how the "similarity relations," the vehicles through which problems in science are solved, are acquired by scientists in training. Similarity relations underlie understanding the definitions of categories of phenomena. Nuances in understanding cannot be prevented; and during scientific revolutions definitions become transformed in the direction of some pre-existing nuance. Eventually the new scientific language is no longer translatable in terms of the old. The changed lexicon structure makes new theories incommensurable with older ones; the correspondence rules of traditional philosophy of science no longer hold as the terms and relations have lost their translatability in language.

The third question: Is there progress in science through revolution? must be answered in a new context, within the history of science. The older view that there is a cumulative body of knowledge about objective reality which is increased by "normal science" and that scientific revolutions are events which expose errors or deconstruct untenable theories must be completely abandoned. In *The Structure of Scientific Revolutions* Kuhn had said that many of the problems associated with formulating a philosophy of science disappear when it is allowed that scientific development does not draw any closer to truth, if truth is a pre-existing, discernible, and absolute reality. Since 1962, when that work was published, Kuhn, himself has been rethinking and redefining his thought and this point would appear to have even greater emphasis today. Since the real nature of things cannot be known with certainty, progress in science can never be seen as growing closer toward that goal. Progress in science can only be the development of theories which are ever more specialized and better articulated. Science progresses in its problem-solving ability and the ability of its theories to make reliable predictions, but not in the sense that the theories come closer to describing nature and what is really there.

The implication here is for various phenomenal worlds without a particular valuation for any one of them. According to Kuhn, the history of science illustrates a succession of theories from Aristotle to Newton to Einstein which are not commensurable and which do not point toward any one ontological certainty or even any convergence. From the perspective of what the natural sciences can reveal in themselves, Kuhn looks like a relativist and from his description of phenomenal reality as subject- and object-sided moments, he looks like an idealist. These

are the charges which are most difficult to dissolve; but they are not accurate. As a historian Kuhn is a realist and as a philosopher he is no more idealist than he is realist. Kuhn's uniqueness is the characterization of science and its theories as instruments of collective understanding of a phenomenal reality by a community of scientists and not as understanding of the world in itself. A big question is opened. What is the relationship between the natural sciences and the social sciences including the study of history?

It seems that like Vico, Kuhn would have it that "Whoever reflects on this cannot but marvel that the philosophers should have bent all their energies to the study of the world of nature, which, since God made it, He alone knows; and that they should have neglected the study of the world of nations, or civil world, which, since men had made it, men could come to know." Men can know, by reconstruction, their own constructions and know them really, as they are in themselves, through the study of history. But how are we to know the world of nature as it is in itself and not simply the scientific constructions we have invented to describe nature? One way to do this, according to Hoyningen-Huene and presumably according to Kuhn, would be to study all the phenomenal worlds men's minds have produced and look for the universal characteristics among them. This approach could be frustrated by the fact that all the phenomenal worlds constructed belong to a common scientific tradition which is more or less narrow. Apparent points of convergence then would be misleading and owing to factors other than actual correspondence with the one real world. One way out of this difficulty would be to subtract the anthropological basis for constructing the world, to determine which capacities for constructing the world are innate and which are learned by interaction with the environment. Here is the first step on the path toward the goal which the natural sciences purport to seek. Absent such knowledge, the natural sciences are historical only.

Reconstructing Scientific Revolutions is a valuable book. By illuminating Thomas Kuhn's philosophy of science, it throws the ball to the philosophers of science who have neglected the history of science and concentrated on clarifying language and language rules for the practicing scientists. In *The Essential Tension* (1977) Kuhn wrote that the history of science would be one way to bridge the gap between philosophers of science and science itself in that history would be a source of problems for study and of data

for the philosophers. After Hoyningen-Huene's book this is even more apparent.

Isaiah Berlin's 1974 lecture on "The Divorce between the Sciences and the Humanities" was the second Tykociner Memorial Lecture. It was published by the University of Illinois and reprinted in *Against the Current: Essays in the History of Ideas*, edited by Henry Hardy (Penguin Books, 1982). Berlin focused on Vico and Voltaire to illustrate the diverging emphasis on strictly rational processes between science and the humanities which eventually contributed to the "divorce" between them. Several of Berlin's insights are of interest to the discussion of Kuhn's work as Hoyningen-Huene interprets it in the book under review. First, Berlin discussed Voltaire's perspective on history, which had its roots in key concepts from early modern science. These are: (1) that every genuine question has one true answer; (2) that the method which will reveal that one answer must be a rational method; and (3) that solutions, whether or not discovered, are universally true. Since Newton, the rational methods of science, which lead to universal true, are generally supposed to be mathematical. While methods of history can not be strictly mathematical, the logic of mathematical reasoning, through the philosophy of positivism, has been applied to all areas of human intellectual endeavor throughout the twentieth century.

Next, Berlin pointed out how Giambattista Vico was the strongest opponent of Voltaire, whom he had described as "the most gifted propagandist" of the scientific ideal. Vico rebelled radically against the idea of certain truth in realms outside of human constructions; he even considered that mathematics, the center piece of rational thought, was only another human invention. Berlin said that Vico thought of mathematics as a sort of game. The rules, definitions, and axioms follow logically because they were constructed to do so. In fact, Vico declared that the external world would remain forever outside of human knowledge and that its mathematical nature was only apparent—a human description, dependent entirely upon human intellect, and not at all dependent upon the essence of nature, in itself. If we abandon certain truth about nature, as Vico and Thomas Kuhn would have it, then what is left, but to understand ourselves and our constructions?

Berlin saw the divorce between science and the humanities as a backlash against the extreme rationalism which has dominated intellectual life in the West since the eighteenth century. Can

the recent revival of interest in Vico be seen as a part of that backlash, fueled by some historians and philosophers who find sterility in strictly rational processes, fractured away from other important human qualities, such as aesthetics and imagination? Could this explain why there has been so much excitement generated by Kuhn's ideas and learning theories? The similarities between Kuhn and Vico might deserve some further reflection; but one thing seems clear. Berlin's definition for Vico's *fantasia*, or imagination, was "the capacity for conceiving more than one way of categorizing reality" which makes it possible to enter other minds, perhaps well outside our own experience; imagination was brought to the study of science by Thomas Kuhn.

Because of his own ability to imagine the minds of the greatest scientists in history and his finding them to be different from one another, Kuhn has been criticized as entertaining counter-rational hypotheses, such as the existence of many worlds. We should remember that Kuhn did not argue for many different real worlds, but for many different ways of seeing the world and describing it in language which is not always translatable from one worldview or from one historical era to another. There are striking similarities between Kuhn's ideas about paradigm shifts, which he has now clarified as changing lexicon structures, and Vico's ideas concerning the modifications of the human mind. Vico's "modifications" are a generalization of Kuhn's more specific interpretation of science as context-dependent. As the discussion and debate about the significance of Kuhn's theories continues, it might be useful for philosophers to reconsider Vico's work in this modern context and to look for a reconciliation between the sciences and humanities in Kuhn's philosophy of science.

Moretown, Vermont